REWIRING YOUR BRAIN

Your brain is a three-pound mass made up of about 100 billion neurons, each one with 1,000 to 10,000 synapses to transmit signals. It is a remarkably efficient and, fortunately, malleable organ that can actually rewire itself if given the proper tools.

In fact, humans continue to make new neurons throughout life in response to mental activity.

Brain volume was commonly believed to stop expanding after age 20. But in MRI brain scans researchers have found that white matter in your brain continues to increase until people are in their mid to late 40s.

If you review the methods section of the paper (Age-Related Changes in Frontal and Temporal Lobe Volumes in Men - A Magnetic Resonance Imaging Study) you will find the research was done on 70 "healthy" adult men aged 19 to 76. Unfortunately the researchers have a far different definition of healthy than you and I. They believe it is someone without obvious disease and I believe it is someone who not only has that but is vibrant and full of life and vitality and plenty of energy.

My guess is that the researchers would find different results if they examined a truly healthy population, as it is likely this growth could continue to expand well into old age.

You see, your brain keeps growing in the temporal lobe and frontal lobe -- the parts of your brain that largely differentiates you from animals. This continued brain growth into middle-age can be associated with better emotional development and wisdom.

BOOST YOUR BRAIN IN JUST 30 HOURS?

According to the work of neuroscientist Michael Merzenich, it takes just 30 hours of neuroscience-based listening training to prompt amazing changes in your brain. Children with learning impairments were able to improve:

- Memory and cognition
- Speech production
- Reading

In other words, they were able to "fix" their brains with the training so they were able to function better with language, memory, speech and other basic skills. Further, the training worked on adults in their 80s and 90s too. Again after just 30 hours of training, elderly people improved:

- Immediate memory
- Delayed memory
- Attention
- Language
- Visio-spatial skills

The "brain training" Merzenich referred to was so effective because your brain is actually very much like a muscle. That is, your brain's structure changes over time and it may be possible to "bulk up" your brain throughout much of adulthood, given the proper training.

And continuing to stimulate and challenge your brain as you get older might promote its growth – just as exercise builds muscle.

This means that the opposite also holds true; that drug use, poor nutrition or other assaults on your brain even in adulthood could interfere with your brain's full development. But your brain is remarkably resilient and capable even of growing new cells to repair itself.

IS NEUROENGINEERING THE ANSWER?

Neuroengineering is a relatively new field that involves the use of engineering techniques to alter your brain. If you are able to change the pattern of your brain's synapses, you can alter your very mind, and this is what neuroengineers attempt to do, often using artificial devices.

One such technique is transcranial magnetic stimulation (TMS), which is already approved to treat depression in Canada and Israel, and is available as a research procedure in the United States. It uses magnetic fields to stimulate nerve cells in your brain, typically to treat depression but also for other conditions such as post-traumatic stress disorder, obsessivecompulsive disorder and bipolar disorder.

TMS may one day be used not only for health purposes, but to provoke changes in mood, such as improving creativity or concentration. One day people could even have access to brain stimulation machines right in their own homes, and use them to give their mood or confidence a quick boost.

While neuroengineering is a fascinating field, this type of artificial "rewiring" of your brain is not without risks. The long-term implications of interfering with the workings of your brain are completely unknown, and even in the short term there is the issue of being exposed to strong electromagnetic fields.

Fortunately, there are a variety of ways to "rewire" your brain naturally to experience improvements in memory, cognition and even mood without any risk of negative side effects.

EIGHT TIPS FOR 'REWIRING' YOUR BRAIN NATURALLY

One of the simplest methods, as Merzenich pointed out in his talk, is to keep on learning.

People often compare your brain to a computer, but there is an important difference. While a computer's hardware does not change, the size and structure of neurons and the connections between them actually change as you learn. This can take on many forms above and beyond book learning to include activities like traveling, learning to play a musical instrument or speak a foreign language, or participating in social and community activities.

Another important method? Brain aerobics. As with learning, challenging your brain with mind training exercises can keep your brain fit as you age. This can be something as simple as searching for famous people whose first names begin with the letter A, doing crossword puzzles or playing board games that get you thinking.

Going one step further, you can also change your lifestyle to boost your brain health by making the following changes:

1. **Take omega-3 fats.** The omega-3 fatty acids eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) keep the dopamine levels in your brain high, increase neuronal growth in the frontal cortex of your brain, and increase cerebral circulation. Krill oil is an excellent source of omega-3, and may even be superior to fish oil.

2. **Exercise.** Exercise may encourage your brain to work at optimum capacity by causing nerve cells to multiply, strengthening their interconnections and protecting them from damage.

3. **Sleep well.** It's during sleep that your mental energy is restored, and a lack of sleep may cause your brain to stop producing new cells.

4. **Eat healthy.** Like the rest of your body, your brain depends on healthy foods to function. While protein is the main source of fuel for your brain, vitamins and minerals from fresh veggies are also important, as is limiting sugar.

5. **Get out into the sun.** This will help you maintain optimal vitamin D levels. Scientists are now beginning to realize vitamin D is involved in maintaining the health of your brain, as they've recently discovered vitamin D receptors in the brain, spinal cord, and central nervous system.

   There's even evidence indicating vitamin D improves your brain's detoxification process. For children and pregnant women, getting enough vitamin D is especially crucial, as it may play a major role in protecting infant's brains from autism.

6. **Turn off your TV.** Allowing children under the age of 3 to watch television can impair their linguistic and social development and it can affect brain chemistry as well.

7. **Protect your brain from cell phones.** Recent studies have found that cell phone users are 240 percent more prone to brain tumours, and a study back in 2004 found that your risk of acoustic neuroma (a tumor on your auditory nerve) was nearly four times greater on the side of your head where your phone was most frequently held.

8. **Avoid foods that contain artificial sweeteners and additives.** Substances such as aspartame (Nutrasweet), artificial color and MSG, which are common in processed foods, can damage your brain. For instance, consuming a lot of aspartame may inhibit the ability of enzymes in your brain to function normally, and high doses of the sweetener may lead to neurodegeneration.

And there you have it. Simple, succinct and smart strategies to encourage your brain to function at its best and continue to grow and make new connections, whether you're 19 or 90.

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